

required to address this objection. However a proposed drawing change is submitted to identify FIGS. 6-8 as prior art.

The Official Action objected to an informality in claim 1. Claim 1 has been cancelled and it is respectfully submitted that new claim 5 avoids the objection to original claim 1.

Claim 1 was rejected under 35 USC § 112 as being indefinite. Claim 1 has been cancelled and the applicant respectfully submits that new claim 5 satisfies the requirements of 35 USC § 112.

Claims 1 and 4 were rejected under 35 USC 102(b) as being anticipated by Takikawa et al.

The Examiner will appreciate that Takikawa et al. is assigned to the assignee of the subject invention, and hence the applicant herein is familiar with this teaching. The teaching of Takikawa et al. provides a very effective solution to certain problems encountered in this art. However, the Takikawa et al. reference is quite different from the invention defined by new independent claim 5 and its dependent claims.

The Takikawa et al. reference relates to a high-pressure fuel injection pipe with a connecting head 2 and a cap collar 3. The cap collar 3 is formed from a thin sheet of material that is selected in view of its high strength and high corrosion resistance. The major function of the cap collar 3 is to reduce or prevent the generation of a chemical corrosion of the outer surface of the steel from which the connecting head is formed. The cap collar 3 also reduces the generation of mechanical cavitation and erosion on the outer surface.

Connection heads are required to have specified dimensions to withstand pressure generated by the fuel flowing therethrough and to accommodate accepted dimensions for the pressure receiving seat to which the connection head is mated and for any nuts or fittings used to connect the connection head. To meet these dimensional requirements, the metal of the pipe shown Takikawa et al. must be deformed a significant amount at the connection head. The deformation results in a well defined crimp in the communication hole or fuel flow path of the Takikawa et al. pipe adjacent to the connection head. The applicant herein has concluded that such a well defined crimp in the fuel flow path creates turbulence in the fuel flowing through the pipe, and hence contributes significantly to mechanical cavitation and erosion. The thin cap collar of Takikawa et al. would have no effect on the magnitude of the internal crimp created during the formation of the connection head. The severity of the internal crimp could be reduced by reducing the overall dimensions of the connection head. However, the smaller connection head would be inherently weaker and would be inconsistent with specifications for the pressure receiving seat surface and the connecting nut. Takikawa et al. does provide a sleeve washer 4. However, the sleeve washer 4 only extends along portions of the pipe adjacent the connection head and adjacent the rear face of the connection head. Takikawa et al. has no suggestion of extending the sleeve washer to cover any part of the connection head. In fact, such an arrangement appears to be entirely inconsistent with the teaching of Takikawa et al., which emphasizes the thin corrosion-resistant cap collar 3. The Examiner will also appreciate that multi-component assembly of Takikawa et al. and the use of a high

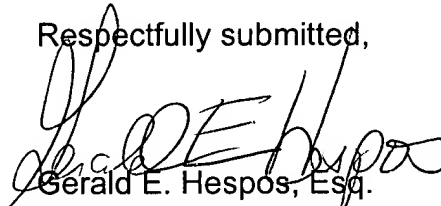
strength corrosion-resistant metal for the cap collar 3 complicates the assembly of the Takikawa et al. connection head and increases the costs.

In contrast to Takikawa et al., the invention defined by new independent claim 5 and its dependent claim includes a unitarily formed sleeve washer surrounding and closely engaging at least a portion of said cylindrical outer surface of said connecting head and having thick-walled cylindrical portion surrounding and closely engaging portions of said cylindrical body adjacent to said connecting head. The uniquely defined sleeve washer performs the inherent function of the sleeve washer shown in Takikawa et al. and in several of the assignees other related patents. However, the sleeve washer of new independent claim 5 surrounds and closely engages at least a portion of the cylindrical surface of the connecting head. Thus, the sleeve washer contributes to the overall external dimension of the connection head, and thereby provides the required structural strength for the connection head and enables the connection head to meet specified diameters. However, and importantly, the unique configuration of the sleeve washer surrounding and closely engaging at least a portion of said cylindrical surface of said connection head reduces the amount of deformation of the high-pressure pipe that is required to form the connecting head. Thus, the annular groove in the passage through the pipe can be very shallow and smooth, as contrasted to the severe and deep annular groove of Takikawa et al. Thus, the high-pressure pipe assembly of new independent claim 5 substantially reduces the generation of mechanical cavitation and erosion.

Nothing in Takikawa et al. teaches or suggests the invention defined by new independent claim 5. Additionally, it is believed that the important teaching of Takikawa et al. namely the provisional of a thin cap collar would substantially prevent the revisions to Takikawa that would be require to bring the Takikawa et al. connecting head closer to the claimed invention without destroying the primary teaching of Takikawa et al.

In view of the preceding amendments and remarks, it is submitted that the new claims pending in the application are directed to patentable subject matter, and allowance is solicited. The Examiner is urged to contact applicant's attorney at the number below if there are any questions relating to this application.

Respectfully submitted,



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